Grade 7 Mathematics I - Answer & Working Sheet

Advanced Assessment - July 2025

Answer Key with Complete Working

Part A - Solutions (2 marks each)

1. Find x if 5x - 3 = 2x + 9

Working:

5x - 3 = 2x + 9
5x - 2x = 9 + 3
3x = 12

x = 4

Answer: x = 4

2. Express 156% as a mixed number in its lowest terms

Working:

156% = 156/100
= 39/25

= 1 14/25

Answer: 1 14/25

3. Find the area of a triangle with base 8.4 cm and height 6.5 cm

Working:

Area = (1/2) × base × height
= (1/2) × 8.4 × 6.5
= (1/2) × 54.6

= 27.3 cm²

Answer: 27.3 cm²

4. Simplify the ratio 3¾ : 1⅝

Working:

3¾ : 1⅝
= 15/4 : 13/8
= 15/4 × 8/8 : 13/8 × 4/4
= 30/8 : 13/8
= 30 : 13

Answer: 30 : 13

5. Simplify: $(a^4 \times a^3) \div a^2$

Working:

$(a^4 \times a^3) \div a^2$
$= a^{4+3} \div a^2$
$= a^7 \div a^2$
$= a^{7-2}$
$= a^5$

Answer: a^5

6. Evaluate: $(-3)^2 \times (-2)^3 + 4^2$

Working:

$(-3)^2 \times (-2)^3 + 4^2$
$= 9 \times (-8) + 16$
$= -72 + 16$
$= -56$

Answer: -56

7. Find the value of $2^4 - 3^2 + 5^0 - (-2)^3$

Working:

$2^4 - 3^2 + 5^0 - (-2)^3$
$= 16 - 9 + 1 - (-8)$
$= 16 - 9 + 1 + 8$
$= 16$

Answer: 16

8. Data: 85, 92, 78, 85, 95, 88, 92, 85, 90. Find range, mode, and median.

Working:

Arranged in order: 78, 85, 85, 85, 88, 90, 92, 92, 95

Range = Highest - Lowest = 95 - 78 = 17
Mode = Most frequent value = 85 (appears 3 times)
Median = Middle value = 88 (5th position out of 9 values)

Answer: Range = 17, Mode = 85, Median = 88

Part B - Solutions (4 marks each)

1. Circle with circumference 1584 cm, path width 3.5 cm

Working:

Circumference = $2\pi r = 1584$
$2 \times (22/7) \times r = 1584$
$r = 1584 \times 7 \div (2 \times 22) = 252$ cm

Outer radius = 252 + 3.5 = 255.5 cm

Area of path = $\pi(R^2 - r^2)$
$= (22/7) \times (255.5^2 - 252^2)$
$= (22/7) \times (65{,}280.25 - 63{,}504)$
$= (22/7) \times 1{,}776.25$
$= 5{,}553.5$ cm²

Answer: 5,553.5 cm²

2. Line relationships

Working:

Line A: $3y = -2x + 12 \rightarrow y = (-2/3)x + 4$, slope = -2/3
Line B: $2y + 3x = 8 \rightarrow y = (-3/2)x + 4$, slope = -3/2
Line C: $y = (2/3)x - 4$, slope = 2/3
Line D: $3x + 2y = 15 \rightarrow y = (-3/2)x + 15/2$, slope = -3/2

Parallel lines have same slope: B and D (both have slope -3/2)
Perpendicular lines: A and C (slopes -2/3 and 2/3, product = $-4/9 \neq -1$)

Actually: A and C are neither parallel nor perpendicular

Answer: Lines B and D are parallel

3. Solve: $3(2x - 1) = 2(x + 3) + 5x - 11$

Working:

$3(2x - 1) = 2(x + 3) + 5x - 11$
$6x - 3 = 2x + 6 + 5x - 11$
$6x - 3 = 7x - 5$
$6x - 7x = -5 + 3$
$-x = -2$

$x = 2$

Answer: $x = 2$

4. Survey of 240 students

Working:

Mathematics: 35% of 240 = 84 students
Science: 40% of 240 = 96 students
Literature: 25% of 240 = 60 students

15% of literature students also like mathematics:

15% of 60 = 9 students

Answer: 9 students

5. Recipe ratio flour : sugar : butter = 5 : 3 : 2

Working:

If sugar = 1.8 kg, and ratio part for sugar = 3
Then 1 ratio part = 1.8 ÷ 3 = 0.6 kg

Flour = 5 × 0.6 = 3.0 kg
Sugar = 3 × 0.6 = 1.8 kg
Butter = 2 × 0.6 = 1.2 kg

Total = 3.0 + 1.8 + 1.2 = 6.0 kg

Answer: 6.0 kg

6. Mean problems

Working:

Mean of 7 numbers = 24
Sum of 7 numbers = 24 × 7 = 168
Sum of 6 given numbers = 18 + 22 + 25 + 28 + 21 + 19 = 133
Seventh number = 168 - 133 = 35

If 35 is replaced by 35: New sum = 133 + 35 = 168

New mean = 168 ÷ 7 = 24

Answer: Seventh number = 35, New mean = 24

7. Right triangle problem

Working:

Given: One angle = 37°, opposite side = 18 cm
sin 37° = opposite/hypotenuse = 18/hypotenuse
0.6 = 18/hypotenuse

hypotenuse = 18 ÷ 0.6 = 30 cm

Answer: 30 cm

8. Navigation problem

Working:

This requires a scale diagram. The ship travels:
- 8 km on bearing 065°
- 6 km on bearing 155°

Using trigonometry or scale drawing:

Direct distance ≈ 10.2 km (approximate)

Answer: ≈ 10.2 km

9. Trapezium area

Working:

Area = (1/2) × (sum of parallel sides) × height
= (1/2) × (12.5 + 8.7) × 6.4
= (1/2) × 21.2 × 6.4
= (1/2) × 135.68

= 67.84 cm²

Answer: 67.84 cm²

10. Convert 3/8 of 2.4 km

Working:

3/8 of 2.4 km = (3/8) × 2.4 = 0.9 km
0.9 km = 0.9 × 1000 = 900 m

900 m = 900 × 100 = 90,000 cm

Answer: 900 m or 90,000 cm

11. Formula for total weight

Working:

Empty box weight = 1.2 kg
Each book weight = 0.85 kg
Number of books = x

Total weight W = 1.2 + 0.85x

Answer: W = 1.2 + 0.85x

12. Field area as percentage

Working:

Field area = 150 × 80 = 12,000 m²
2 hectares = 2 × 10,000 = 20,000 m²

Percentage = (12,000/20,000) × 100% = 60%

Answer: 60%

13. Evaluate with p = -3, q = 4, r = -2

Working:

$2p^2 - 3q + r^3$
$= 2(-3)^2 - 3(4) + (-2)^3$
$= 2(9) - 12 + (-8)$
$= 18 - 12 - 8$

$= -2$

Answer: -2

14. Semicircular arch area

Working:

Diameter = 14 m, so radius = 7 m
Area of semicircle = $(1/2) \times \pi \times r^2$
$= (1/2) \times (22/7) \times 7^2$
$= (1/2) \times (22/7) \times 49$
$= (1/2) \times 22 \times 7$

$= 77$ m²

Answer: 77 m²

15. Simplify algebraic expression

Working:

$4(2a - 3b) - 3(a + 2b) + 2(3a - b)$
$= 8a - 12b - 3a - 6b + 6a - 2b$
$= (8a - 3a + 6a) + (-12b - 6b - 2b)$

$= 11a - 20b$

Answer: 11a - 20b

16. Marathon time calculation

Working:

Distance = 42.195 km
Speed = 12 km/h
Time = Distance ÷ Speed = 42.195 ÷ 12 = 3.516 hours
3.516 hours = 3 hours + 0.516 hours

0.516 hours = 0.516 × 60 = 31 minutes

Answer: 3 hours 31 minutes

Part C - Solutions (5 marks each)

1. Probability problems

Working:

Total balls = 8 + 12 + 15 + 5 + 10 = 50

(i) P(green) = 15/50 = 3/10

(ii) P(red or blue) = P(red) + P(blue) = 8/50 + 12/50 = 20/50 = 2/5

(iii) P(both black) = P(first black) × P(second black|first black)

= (10/50) × (9/49) = 90/2450 = 9/245

Answer: (i) 3/10, (ii) 2/5, (iii) 9/245

2. Bill calculation

Working:

3¾ kg rice at Rs. 285/kg = 3.75 × 285 = Rs. 1,068.75
1 dozen eggs at Rs. 45/egg = 12 × 45 = Rs. 540
2.5 kg flour at Rs. 168/kg = 2.5 × 168 = Rs. 420

Total cost = 1,068.75 + 540 + 420 = Rs. 2,028.75

Answer: Rice: Rs. 1,068.75, Eggs: Rs. 540, Flour: Rs. 420, Total: Rs. 2,028.75

3. Square and rectangle problem

Working:

(i) Let width of rectangle = w cm
Square side = w cm
Rectangle length = w + 5 cm
Total area = $w^2 + w(w + 5) = w^2 + w^2 + 5w = 2w^2 + 5w$

(ii) $2w^2 + 5w = 169$
$2w^2 + 5w - 169 = 0$
Using quadratic formula: $w = (-5 \pm \sqrt{(25 + 1352)})/4 = (-5 \pm \sqrt{1377})/4$
$w = (-5 + 37.11)/4 \approx 8.03$ cm (taking positive value)
$w \approx 8$ cm

(iii) Rectangle area = $w(w + 5) = 8 \times 13 = 104$ cm²

(iv) Combined perimeter = $2w + 2(w + 5) + 2w = 6w + 10 = 58$ cm

Answer: (i) $2w^2 + 5w$, (ii) w = 8 cm, (iii) 104 cm², (iv) 58 cm

---

Total Marks: 95

Grade Boundaries:

- A* (85-95): Outstanding
- A (75-84): Excellent
- B (65-74): Good
- C (55-64): Satisfactory
- D (45-54): Needs Improvement
- F (Below 45): Fail